Department of Fisheries and Oceans
Canadian Stock Assessment Secretariat
Research Document 97/08

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Ministère des pêches et océans
Secrétariat canadien pour l'évaluation des stocks
Document de recherche 97/08

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Summary of Performance of the 1996 Newfoundland and Labrador Snow Crab Fishery

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Abstract

Summaries of fishery performance in the Newfoundland and Labrador snow crab, Chionoecetes opilio, fishery are provided for 34 management areas within five NAFO Divisions. Comparative data are provided on yearly landings, effort and CPUE's for individual management areas and fleet components. In 1996 landings reached a record level of 38,007 t, an 18.8% increase over those achieved in 1995. This increase in landings is due to continuing high levels of abundance of commercial-sized animals in most snow crab management areas. In addition to fishery performance statistics, figures illustrating fishing positions reported from 1994, 1995 and 1996 logbooks are presented.

Résumé

Des résumés du rendement de la pêche du crabe des neiges Chionoecetes opilio de Terre-Neuve et du Labrador sont présentés pour 34 zones de gestion réparties dans cinq divisions de l'OPANO. Des données comparatives sont présentées pour les débarquements, l'effort de pêche et les PUE annuels de zones de gestion et de secteurs de la flottille. En 1996, les débarquements ont atteint un niveau record de 38 007 t, soit une augmentation de 18,8 % par rapport à ceux de 1995. Cette augmentation s'explique par des niveaux d'abondance constamment élevés d'animaux de taille commerciale dans la plupart des zones de gestion. On trouve aussi, outre les statistiques sur le rendement de la pêche, des figures illustrant les lieux de pêche signalés dans les registres pour 1994, 1995 et 1996.

Introduction

The Newfoundland snow crab (Chionoecetes opilio) fishery began in Trinity Bay in 1968. Initially, the catch consisted solely of crabs caught as groundfish gillnet bycatch but within several years there was a directed trap fishery in most inshore areas along the northeast coast of the Island. After this initial areal expansion, the fishery remained relatively stable until the early 1980's when the collapse of the Alaskan king crab fishery triggered a rapid expansion of the fishery both in terms of effort and landings but also in terms of fishing grounds. During this time the fishery was prosecuted by approximately 50 vessels which were restricted to using 800 traps each. In 1981 Zonal Management was introduced which essentially restricted vessels to exclusively fishing the NAFO Division where licence holders resided.

The mid 1980's represent a turning point for the fishery with a depletion of the crab resource in most areas of NAFO Divisions 3K and 3L and the commencement of fisheries in 2J and 3Ps. In 1985 a supplementary fishery prosecuted by enterprises needing to supplement their income from a failing groundfish fishery was started in 3K. Vessels prosecuting this fishery were restricted to 150 traps and fished the same grounds as the fulltime vessels. A supplementary fishery in 3L commenced in 1987 with the same regulatory regime as that for 3K supplementary fishermen.

In 1987 quota management was initiated in all areas of 3L accompanied by a redefinition of fishing seasons for both fleet sectors. Quota management was initiated in 3K in 1988. Depending on the area, fishing by supplementary vessels was restricted to specified seasons in the spring or fall or, in some cases, the quota was split between a fall and a spring season. With the introduction of quota management, areas were redefined and quotas allocated to individual management areas (Fig. 1) by fleet sector. There is no biological basis for the current definition of management areas but rather, they are an attempt to allocate effort proportionally to resource availability. This strategy is an attempt to prevent over exploitation of near-shore areas. In 1989 fulltime vessels were restricted to offshore fishing grounds, and bays, (except Bonavista Bay), were reserved for the supplementary fleet.

The fishery in Labrador began in 1985 and expanded significantly in 1991 with the commencement of fishing activity north of 53:30 Latitude. This fishery, centered in Cartwright, is fished exclusively by supplementary vessels and they, like their southern Labrador counterparts, are permitted to fish 300 traps.

In 1994 there were several important changes in the snow crab fishery. In 3K, a dockside monitoring program run by fishers was instituted with a great deal of success. Access to the fishery for supplementary vessels was expanded in 1994. There were now 3 fleet sectors; fulltime, supplementary larger than 40 gross tons in weight and supplementary less than 40 gross tons in weight but having an overall length greater than 35 ft. All three fleet components have designated trap limits, quotas and fishing areas. In order to avoid "gluts" trip limits and/or weekly harvest limits were introduced.

In 1995 dockside monitoring was extended to all NAFO divisions thereby providing reasonable assurance that data on vessel landings was accurate. Monitors were required to initial fishers logbook entries in order to validate them. Also in 1995, an additional fleet of fishers gained access to the snow crab resource. Vessels under 35 ft. LOA were issued temporary seasonal permits and permitted access to the fishery. 360 permits were issued with an allocation of 1800 t and each bay was allocated a quota and number of permits reflective of resource availability. Where too many fishers applied for the number of permits available, a draw system was implemented. Fishing grounds in all NAFO Divisions were extended offshore (outside of 200 n. miles in NAFO Division 3LNO).

The 1996 Newfoundland and Labrador snow crab fishery expanded in several ways from the level of activity experienced in 1995. Landings (Table 6) increased to 38,007 t (quota 38,905 t), an 18.8% increase over 1995 landings (31,986 t). Areally, several new fishing areas were occupied in 1996 with excellent results overall in terms of catch rates and quality. Many new participants fished snow crab for the first time as additional temporary permits were issued to fishers using vessels under 35 ft. LOA. Enterprise allocations have been adopted by almost all fleet sectors, either partially (3Ps supplementary) or in full (2J, 3K and 3LNO fulltime). In 1996 there were over 2600 enterprises licensed to participate in the snow crab fishery (Table 1).

1996 saw the introduction of a two-tiered pricing structure for snow crab, as well as the implementation of enterprise allocations,(EA's) for almost every harvesting sector. These changes, in tandem with trip limits and weekly catch limits, resulted in a much more regulated and directed fishery than in past years. The two-tiered pricing system was designed to encourage fishers to harvest selectively, crab in excess of 103mm carapace width. This new pricing structure may have contributed to increased discard mortality in that observers reported that fishers were retaining legal-sized crab under 103mm CW until they had caught their assigned trip limit of crabs over 103mm CW. Then, unwanted legal-sized crabs were returned to the water after up to several hours on board the vessel undoubtedly increasing the frequency of discard mortality. The absence of a competitive fishery with the introduction of individual quotas allowed fishers to take their time and high-grade large crab but at a cost of increased discard mortality.

Methods

Fishery Performance - Logbook Data

Raw data on fishers catches, effort (trap hauls) and fishing positions were extracted from logbooks, analysed and summarized by the Informatics and Statistics Branch of the Newfoundland Region of Fisheries and Oceans. In the past, this exercise had been conducted exclusively by Science Branch personnel and in order to determine possible errors which might be associated with inexperience, a sub-sample of logs from each management area was analysed by

Science Branch and a comparison made with the results achieved by Informatics and Statistics Branch (Tables 2-5). As these tables demonstrate, there was generally good correlation between the two summaries.

While not all logbook entries were usable due to errors or omissions on the part of the fisher, most were at least superficially suitable for generating estimates of CPUE for each management area and for use in plotting distribution of fishing activity.

Figures 3a, b and c illustrate the distribution of fishing effort for 1996 in relation to that for 1994 and 1995. While the general pattern of fishing activity remains similar between years, the offshore expansion in all east coast NAFO Divisions over the past 2 years is evident.

Observer Data

Data on catches, size-frequency and shell condition were collected by observers from Seawatch Inc. and analysed to determine the degree of comparability between commercial logbook data and research cruise data. CPUE was determined by utilizing the width-weight regression defined by Taylor and Warren (1990)and applying it to observer-supplied and research-cruise measurements of legal-sized crabs.

Results

Fishery Performance

Landings increased in NAFO Divisions 3LNO, 3K and 3Ps from 1995 levels but decreased marginally in NAFO Divisions 2J and 4R (Fig. 2). A summary of fishery data by NAFO Division from 1979 to 1996 is presented in Table 6. An overview of CPUE's as determined by logbook analyses are presented in Table 7 for each management area and can be summarized as follows:

2J

After declining for several years in a row, CPUE's increased in the north and south by 28% and 27% respectively. This increase is principally due to the discovery of new fishing grounds in the offshore areas. Inshore, particularly in the northern zone, soft-shelled crab was a serious problem early in the fishing season but became less of a problem as fishers searched out areas with crab of more acceptable quality.

3K

Catch rates (CPUE) in Canada Bay (3A) and White Bay (3B) were higher than in 1995 while those in Green Bay (3C) and Fogo-Twillingate (3D) were reduced by 38% and 20% respectively. Although the CPUE reported for Offshore 3K (4) reflect no change in catch rates it should be noted that this is a very large area and anecdotal information from fishers indicates that the nearshore fishing grounds had lower catch rates than in 1995. Two of the three offshore

management areas experienced improved catch rates over those of 1995 despite the fact that many fishers retained only crab in excess of 103mm CW.

3L

Virtually all areas of this NAFO Division reported reduced catch rates from those of 1995. These figures are difficult to interpret for two reasons. Firstly, virtually all vessels were high grading for large crab. Secondly, the majority of full-time and large supplementary vessels increased the mesh size of their traps in order to reduce culling time during fishing. Both these factors could have significantly reduced CPUE in comparison to previous years. Despite these apparently artificial reductions in catch rates in these areas, CPUE's in almost all areas (with the possible exception of Inner Bonavista, Trinity and St. Mary's Bays) remained at relatively high levels.

3Ps

CPUE's increased in Placentia Bay (10), remained the same in the Halibut Channel (10C) and increased markedly in Fortune Bay (11). This increase in Fortune Bay is chiefly due to the discovery of new fishing grounds well offshore from the mouth of the Bay (11X). In addition to the reported catches from the Newfoundland fleet in 3Ps, vessels fishing out of St. Pierre are reported to have landed 190 t from grounds adjacent to the Halibut Channel.

4R

Catch rates for all areas remained essentially the same as for 1995 and would be considered low by east coast standards.

Detailed information on the fishery performance in individual management areas is presented in Tables 8 through 40.

Observer Data

Comparative CPUE data are presented in Table 41 . Unfortunately, these observer data are insufficient for meaningful comparison with values derived from logbook submissions.

Discussion

Prognosis

Immediate prospects for the Newfoundland and Labrador snow crab fishery are that for the short-term, abundance and catch rates will remain at relatively high levels in most areas. Declining recruitment may represent a problem in inshore areas of 3K and 3L but is not evident in 2J or 3Ps or in offshore areas. The problems represented by the introduction of a two-tiered price system may not surface in 1997 as fishers appear to be unanimous in insisting that this practice be eliminated in future.

Uncertainties

The impact of new culling practices in response to a two-tiered pricing system makes direct comparison of CPUE's from 1995 to 1996 difficult to interpret. In addition, the switch to larger meshed traps by offshore fishers in Division 3L further compromises the validity of year-to-year comparison. Another problem raised by the introduction of the two-tiered pricing system is the impact of the reported increase in discard mortality through improper culling practices on the abundance of commercial-sized (but under 103mm CW) male crabs on future commercial CPUE's. Morphometric studies have demonstrated that in the last 2 years most males between 95 and 102 mm CW are large-clawed and will never molt to a larger size. The effects of selectively harvesting males larger than 103mm CW while leaving smaller legal-sized males on the fishing grounds are unknown. However, as the shells of these discards age over time they become less valuable and more difficult to process.

Another uncertainty that has recently become prominent is the reported increase in the incidence of crabs infected with Bitter Crab Disease (BCD)(Taylor and Khan 1995). Presently, this disease appears to be largely restricted to certain areas of NAFO Division 3K but appears to have spread within this area over the last several years. This condition is caused by a parasitic dinoflagellate (Hematodinium sp.) and is fatal to crabs but harmless to humans. An unfortunate symptom of this disease is that infected crabs are unpalatable and may contaminate the meat of non-infected crabs that happen to be cooked with them in a batch cooker. The only practical means of dealing with this disease is education. Fishers have been asked to land all infected crabs and dispose of them at landfill sites. Discarding infected individuals at sea will undoubtedly contribute to the spread of the disease since many fishers cull and discard crab while steaming from one site to the next.

Acknowledgements

We thank M. Rees for typing this manuscript. S. Savory and other staff of the Policy and Economics Branch provided a breakdown of logbook data. H.J. Drew generated the map depicting 1996 fishing positions.

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Table 1. Summary of licences by area for the Newfoundland and Labrador 1996 snow crab fishery.

Licence type	NAFO Division					Total
	2J	3K	3LNO	3Ps	4R	
Fulltime	4	29	42	-	-	75
Supp.	31	230	323	92	-	676
Explor.	-	-	4	-	59	63
Temp.	46	640	578	358	188	1810
Total	81	899	947	450	247	2624

Table 2. Comparison of Statistics for the 1996 snow crab fishery in NAFO Div. 2J.

Area	Status	CPUE from Stats. Branch logs	Sub-sample of Logs		Diff.
			No. boats	CPUE	
2JS	S	8.5	9	8.1	-0.4
2JS	F	11.9	2	11.9	0
2JSX	S	11.8	5	11.8	0
2JN	S	6.5	7	6.3	-0.2
2JNX	S	12.0	9	12.9	0.9
2JO	S	9.0	10	10.6	1.6
2JO	F	12.2	4	11.7	-0.5

Status S = supplementary; F = fulltime

CPUE for all areas is expressed as kg/trap haul.

Table 3. Comparison of Statistics for the 1996 snow crab fishery in NAFO Div. 3K.

Area	Status	CPUE from Stats. Branch logs	Sub-sample of Logs		Diff.
			No. boats	CPUE	
3A	S	5.3	7	5.4	0.1
3B	S	9.7	10	9.0	-0.7
3C	S	5.6	10	5.8	0.2
3D	S	6.7	15	6.7	0
3KB	S	12.4	7	13.4	1.0
3KB	F	16.4	7	15.2	-1.2
3KC	S	14.6	9	15.0	0.4
3KC	F	16.1	8	14.1	-2.0
3KG	S	15.8	6	17.4	1.6
3KG	F	16.5	6	17.5	1.0
3KCG	S	14.4	10	17.6	3.2
3KCG	F	12.4	5	9.8	-2.6
3KN	S	11.3	10	11.5	0.2
4	S	11.0	9	9.7	-1.3
4	F	15.1	8	14.5	-0.6

Status S = supplementary; F = fulltime

Table 4. Comparison of Statistics for the 1996 snow crab fishery in NAFO Div. 3L.

Area	Status	CPUE from Stats. Branch logs	Sub-sample of Logs		Diff.
			No. boats	CPUE	
5A	S	10.3	9	12.8	2.5
5B	S	13.2	13	13.2	0
5B	F	14.6	9	14.8	0.2
5BX	S	15.8	8	15.2	-0.6
5BX	F	15.2	8	14.7	-0.5
6A	S	8.3	13	9.2	0.9
6B	S	12.5	14	10.5	-2.0
6C	S	15.2	15	14.3	-0.9
6C	F	19.6	11	18.7	-0.9
7A	S	11.8	18	12.0	0.2
7A	F	14.1	10	17.6	3.5
7B	S	16.5	8	16.4	-0.1
7B	F	18.0	11	18.0	0
7C	S	15.8	7	18.5	2.7
7C	F	17.5	10	16.5	-1.0
7BCX	S	18.5	6	17.9	-0.6
7BCX	F	16.9	9	18.9	2.0
8A	S	18.3	8	17.6	-0.7
8B	S	16.4	14	16.1	-0.3
9A	S	9.1	6	9.2	0.1
9B	S	10.8	2	8.5	-2.3
3LX	S	17.9	7	16.3	-1.6
3LX	F	17.5	8	15.2	-2.3
3LMN	S	10.6	6	10.3	-0.3
3LMN	F	9.7	7	10.5	0.8

Status S = supplementary; F = fulltime

Table 5. Comparison of Statistics for the 1996 snow crab fishery in NAFO Div. 3Ps.

Area	Status	CPUE from Stats. Branch logs	Sub-sample of Logs		Diff.
			No. boats	CPUE	
10A	S	19.5	10	21.6	2.1
10B	S	20.3	11	18.7	-1.6
10C	S	18.2	10	14.6	-3.6
11	S	13.8	12	16.5	2.7
11X	S	6.3	9	6.8	0.5

Status S = supplementary; F = fulltime

Table 6. Summary of performance of the Newfoundland snow crab fishery, 1979-96.

Year	Div. 2J		Div. 3K		Div. 3LMNO		Div. 3Ps		Div. 4R		Total Newfoundland	
	Catch (t)	('000 trap) hauls	Catch (t)	('000 trap) hauls	Catch (t)	('000 trap) hauls	Catch (t)	('000 trap) hauls	Catch (t)	('000 trap) hauls	Catch (t)	('000 trap) hauls
1979	-	-	788	79	9,426	666	-	-	-	-	10,214	745
1980	-	-	628	58	8,190	527	-	-	-	-	8,818	585
1981	-	-	1,202	94	12,636	808	-	-	-	-	13,838	902
1982	-	-	2,505	215	10,673	762	-	-	-	-	13,178	977
1983	-	-	4,868	520	6,188	745	-	-	-	-	11,056	1,265
1984	-	-	5,080	606	4,476	679	-	-	-	-	9,556	1,285
1985	311	20	3,953	670	2,605	496	602	-	-	-	7,471	1,186
1986	467	40	3,958	917	3,467	490	651	-	-	-	8,543	1,447
1987	256	30	2,656	730	3,083	552	596	199	-	-	6,591	1,511
1988	451	48	2,565	656	5,903	641	856	231	-	-	9,775	1,576
1989	523	50	2,359	477	4,985	653	529	113	-	-	8,396	1,293
1990	645	51	4,253	334	5,211	608	596	119	-	-	10,705	1,112
1991	989	66	7,675	523	6,394	688	176	31	-	-	15,234	1,308
1992	1,529	110	7,295	551	6,652	519	121	10	-	-	15,597	1,190
1993	2,275	161	9,760	595	8,979	554	704	61	-	-	21,718	1,371
1994	2,978	295	11,039	869	12,237	847	1,590	96	655	119	28,499	2,226
1995	3,178	402	12,245	1,065	13,790	806	1,853	185	920	159	31,986	2,617
1996	3,090	303	14,185	1,163	16,847	1,110	3,052	184	833	141	38,007	2,909

* In addition to the total catch of 38,007 t a catch of 1,032 t was caught in 4R and landed in Quebec.

Table 7. Summary of management area of the comparison of 1994-95 and 1995-96 snow crab fishery data. Numbers represent the percentage change.

	Landings		Effort		CPUE	
Area	1995 vs 1994	1996 vs 1995	1995 vs 1994	1996 vs 1995	1995 vs 1994	1996 vs 1995
2J						
North	-21	-11	-15	-10	-7	0
South	-4	-25	+32	-26	-27	+24
3K						
3A	+21	+3	+73	-22	-30	+33
3B	-14	+63	+5	+43	+5	+14
3C	+13	+43	+9	+137	+3	-40
3D	+21	+4	+52	+30	-21	-20
4	+3	-5	+16	+3	-14	-7
3Kb	-15	-11	-15	-19	0	+11
3Kc	+6	-2	+13	-10	-6	+9
3Kg	+46	-4	+26	+12	+16	-14
3L						
5A	-29	-44	-23	-26	-8	-26
5B	+31	+33	-38	+58	+11	-15
5Bx	-15	+40	-57	+70	+96	-18
6A	+19	+18	-9	+90	+30	-38
6B	+24	+15	+11	+28	+12	-10
6C	+5	+14	+9	+29	-8	-11
7A	-1	-6	+4	+16	-4	-19
7B	+6	+5	+9	+17	-3	-9
7C	+15	-3	-7	+15	+23	-13
8A	-31	-8	-45	-16	+11	+11
9	-14	+3	+27	+66	-10	-38
3Ps						
10A	-22	+48	-23	+20	+2	+23
10C	+108	-9	+215	-7	-10	-2
11	-7	-13	+117	-65	-62	+146

This table was constructed from fishery performance information collated from vessel logbooks in each of the management areas. The comparisons made based on CPUE may not accurately reflect abundance.

Table 8. Area 2J - Southern Labrador.

Year	Total landings		Total effort		CPUE (kg/trap)		Quota (t)	
	(t)	(Supp.)	('000s)	(Supp.)	Full	(Supp.)	Full	(Supp.)
1985	311		20.5		15.2			
1986	467		39.6		11.8			
1987	256		30.1		8.5			
1988	451		48.5		9.3		926	
1989	523		50.3		10.4		920	
1990	645		51.2		12.6		920	
1991	917		59.2		15.5		920	
1992	1077	(317)	76.0	(22.5)	14.2	(14.4)	720	(300)
1993	1331	(455)	91.6	(31.6)	14.7	(14.4)	860	(440)
1994	1466	(491)	130.2	(54.6)	12.9	(9.0)	860	(440)
1995	1384	(779)	175.2	(111.3)	10.0	(7.0)	600	(760)
1996	1043	(547)	129.3	(87.6)	11.9	(8.5)	500	(600)

Table 9. Area 2JS extended (east of 53°30'W).

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1995	334	40.7	8.2	300
1996	331	28.1	11.8	300

An area south of 54°40'N and >100 n mi offshore was fished in 1996 resulting in a catch of 91 t (CPUE 12.2) by fulltime fishers and a catch of 261 t (CPUE 9.0) by supplementary fishers.

Table 10. Area 2J - Northern Labrador.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1991	72	6.6	10.9	500
1992	452	45.7	9.9	400
1993	984	80.0	11.8	1000
1994	1182	168.9	7.0	1300
1995	931	143.2	6.5	1040
1996	833	128.2	6.5	900

Fishers reported that the traditional fishing grounds had a high abundance of soft-shelled crabs during the first half of the fishing season. They successfully lobbied the Department for a northward extension of the fishing grounds which resulted in increased CPUE over levels experienced in 1995.

Table 11. Area 2JN extended (east of 53°30'W).

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1995	529	60.1	8.8	500
1996	531	44.2	12.0	575

Table 12. Area 3A - Canada Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1992	82	8.2	10.0	50
1993	104	10.0	10.4	75
1994	112	19.6	5.7	100
1995	136	34.0	4.0	150
1996	140	26.4	5.3	200

Table 13. Area 3B - White Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1979	297	33.0	9.0	
1980	254	24.7	10.3	
1981	552	39.1	14.1	
1982	1153	84.2	13.7	
1983	2474	240.2	10.3	
1984	3048	354.4	8.6	
1985	1336	262.0	5.1	
1986	1353	397.9	3.4	
1987	418	154.8	2.7	
1988	387	184.3	2.1	750
1989	206	98.1	2.1	250
1990	182	41.4	4.4	150
1991	-	5.0	-	200
1992	209	26.1	8.0	200
1993	377	44.4	8.5	300
1994	476	58.8	8.1	400
1995	408	48.0	8.5	400
1996	667	68.8	9.7	700

Fishers in this area reported improved catch rates over 1995. Some fishers reported encountering crabs infected with Bitter Crab Disease (BCD) but felt that overall, it was a minor problem centered around the Horse Islands area, an area where little fishing activity takes place.

Table 14. Area 3C - Green Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1979	491	46.3	10.6	
1980	374	37.8	9.9	
1981	650	54.6	11.9	
1982	1352	130.0	10.4	
1983	537	88.0	6.1	
1984	502	76.1	6.6	
1985	476	80.7	5.9	
1986	938	246.8	3.8	
1987	303	112.2	2.7	
1988	255	127.5	2.0	400
1989	243	69.4	3.5	180
1990	260	47.3	5.5	280
1991	407	59.9	6.8	400
1992	416	47.8	8.7	400
1993	606	60.0	10.1	500
1994	611	67.9	9.0	600
1995	689	74.1	9.3	750
1996	984	175.7	5.6	1000

Fishers reported that catch rates were reduced over levels achieved in 1995.

Table 15. Area 3D - Fogo-Twillingate.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1983	1857	191.4	9.7	
1984	1463	164.4	8.9	
1985	1063	141.7	7.5	
1986	895	165.7	5.4	
1987	424	83.1	5.1	
1988	800	163.3	4.9	300
1989	410	75.9	5.4	400
1990	709	77.1	9.2	600
1991	1593	156.2	10.2	1300
1992	1183	113.8	10.4	1200
1993	1297	107.2	12.1	1200
1994	1169	111.3	10.5	1200
1995	1419	168.9	8.4	1400
1996	1476	220.3	6.7	1550

Table 16. Area 4 - 3K offshore.

Year	Total landings		Total effort		CPUE (kg/trap)		Quota (t)	
	(t)	(Supp.)	('000s)	(Supp.)	Full	(Supp.)	Full	(Supp.)
1984	67		11.0		6.1			
1985	225		40.2		5.6			
1986	772		108.7		7.1			
1987	594		108.0		5.5			
1988	1123		184.1		6.1		1900	
1989	1534		229.0		6.7		1600	
1990	3102		168.6		18.4		3300	
1991	5579	(1060)	378.4	(90.6)	15.7	(11.7)	4300	(1400)
1992	5405	(2030)	407.8	(175.0)	14.5	(11.6)	3100	(1700)
1993	5772	(2154)	351.0	(137.0)	16.9	(15.7)	3200	(1800)
1994	5662	(2269)	363.8	(173.2)	17.8	(13.1)	3200	(1800)
1995	5805	(3515)	432.2	(283.5)	15.4	(12.4)	2300	(3200)
1996	5506	(3197)	443.5	(290.6)	15.1	(11.0)	2300	(3200)

Anecdotal information suggests that CPUE was lower in nearshore areas while offshore CPUEs were comparable to those achieved in 1995. A relatively high incidence of BCD was encountered by fishers in this area.

Table 17. Area 3Kb*

Year	Total landings		Total effort		CPUE (kg/trap)		Quota (t)	
	(t)	(Supp.)	('000s)	(Supp.)	Full	(Supp.)	Full	(Supp.)
1993	868		51.4		16.9		750	
1994	1319	(873)	107.1	(68.7)	11.6	(12.7)	335	(665)
1995	1122	(773)	91.0	(66.1)	14.0	(11.7)	350	(650)
1996	995	(656)	73.6	(52.9)	16.4	(12.4)	350	(650)

Table 18. Area 3Kc*.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1994	971	(557)	65.6	(38.7)	15.4	(14.4)	335	(665)
1995	1026	(687)	73.9	(46.1)	12.2	(14.9)	350	(650)
1996	1008	(662)	66.8	(45.3)	16.1	(14.6)	350	(650)

*A quota of 700 t was allocated to supplementary crab fishers in both 3Kb and 3Kc north of 51°49'W latitude which resulted in a catch of 1431 t (CPUE 11.3).

Table 19. Area 3Kg.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1994	719	(572)	44.6	(36.0)	17.1	(15.9)	165	(335)
1995	1049	(707)	56.1	(36.8)	17.7	(19.2)	350	(650)
1966	1009	(661)	62.9	(41.8)	16.5	(15.8)	350	(650)

Table 20. Area 3Kcg.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1995	591	(318)	37.9	(41.3)	7.2	(7.7)	350	(650)
1996	969	(619)	71.2	(43.0)	12.4	(14.4)	350	(650)

Table 21. Area 5A - Bonavista Bay.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1979	1586		172.4		9.2			
1980	1905		192.4		9.9			
1981	1376		172.0		8.0			
1982	905		96.3		9.4			
1983	1101		203.9		5.4			
1984	1327		250.4		5.3			
1985	728		251.0		2.9			
1986	648		140.9		4.6		500	
1987	602		84.8		7.1		500	
1988	844	(109)	89.6		8.2		600	(100)
1989	959	(320)	75.2		8.5		600	(300)
1990	1072	(416)	91.1	(37.8)	12.3	(11.0)	600	(300)
1991	1102	(479)	102.8	(41.7)	10.2	(11.5)	650	(350)
1992	1160	(468)	82.6	(35.2)	14.6	(13.3)	650	(350)
1993	1431	(526)	99.1	(41.1)	15.6	(12.8)	700	(400)
1994	1550	(984)	101.2	(70.3)	18.3	(14.0)	500	(600)
1995	1106	(736)	78.4	(52.9)	14.5	(13.9)	375	(725)
1996*	-	(1006)	-	(97.7)	-	(10.3)	-	(1000)

* In 1996 fulltime vessels were excluded from fishing in this area.

Table 22. Area 5B - Outer Bonavista Bay.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1990	161	(161)	36.6	(36.6)	-	(4.4)	200	(200)
1991	479	(479)	41.6	(41.6)	-	(11.5)	350	(350)
1992	769	(433)	48.6	(27.9)	16.2	(15.5)	400	(400)
1993	1277	(826)	78.6	(47.5)	14.5	(17.4)	500	(500)
1994	1562	(868)	105.0	(57.5)	14.6	(15.1)	700	(600)
1995	1445	(881)	89.2	(56.8)	17.5	(15.5)	500	(800)
1996	1923	(1275)	141.0	(96.6)	14.6	(13.2)	600	(1200)

Table 23. Area 5B - extended.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1994	697	(431)	72.5	(49.0)	11.3	(8.8)	200	(400)
1995	592	(237)	31.5	(12.5)	18.7	(19.0)	400	(400)
1996	827	(388)	53.5	(24.6)	15.2	(15.8)	500	(500)

Table 24. Area 6A - Inner Trinity Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1979	67	4.2	16.0	
1980	59	4.6	12.9	
1981	110	14.9	7.4	
1982	65	10.7	6.1	
1983	72	12.0	6.0	
1984	17	2.5	6.9	
1985	19	5.0	3.8	
1986	18	3.5	5.1	
1987	44	9.0	4.9	100
1988	98	22.8	4.3	75
1989	180	35.3	5.1	200
1990	232	38.0	6.1	200
1991	259	46.3	5.6	200
1992	177	21.6	8.2	200
1993	380	43.2	8.8	275
1994	490	48.0	10.2	400
1995	583	43.8	13.3	525
1996	689	83.0	8.3	700

Fishers in this area felt that the reduced catch rates experienced may have been the result of capelin on the grounds acting as food thus reducing the catchability of crabs by baited traps.

Table 25. Area 6B - Conception Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1979	464	28.8	16.1	
1980	869	56.4	15.4	
1981	502	43.7	11.5	
1982	694	60.9	11.4	
1983	564	64.1	8.8	
1984	333	52.0	6.4	
1985	139	26.2	5.3	
1986	193	32.7	5.9	
1987	227	24.7	9.2	
1988	499	45.0	11.1	
1989	476	78.0	6.1	500
1990	314	62.8	5.0	500
1991	383	100.8	3.8	400
1992	304	49.8	6.1	300
1993	309	44.1	7.0	300
1994	416	33.5	12.4	300
1995	516	37.1	13.9	525
1996	595	47.6	12.5	650

Table 26. Area 6C - Eastern Avalon

	Total landings		Total effort		CPUE (kg/trap)		Quota (t)	
Year	(t)	(Supp.)	('000s)	(Supp.)	Full	(Supp.)	Full	(Supp.)
1979	7632		436.1		17.5			
1980	5065		242.3		20.9			
1981	7607		484.5		15.7			
1982	3368		253.2		13.3			
1983	801		108.2		7.4			
1984	312		55.7		5.6			
1985	113		24.6		4.6			
1986	144		26.7		5.4			
1987	172		29.7		5.8			
1988	751		72.2		10.4		300	(300)
1989	661		68.1		9.7		400	(300)
1990	850	(231)	102.0	(36.1)	9.4	(6.4)	600	(400)
1991	1090	(391)	134.7	(61.1)	9.5	(6.4)	600	(400)
1992	1078	(428)	102.2	(47.6)	11.9	(9.0)	600	(400)
1993	1541	(839)	88.5	(55.2)	21.1	(15.2)	700	(500)
1994	2024	(1391)	110.5	(79.9)	20.7	(17.4)	700	(900)
1995	2128	(1658)	120.9	(97.0)	19.7	(17.1)	425	(1512)
1996*	2432	(2152)	155.9	(141.6)	19.6	(15.2)	300	(1600)

* A quota of 300 t was allocated to the temporary seasonal fishers for Eastern/Southern Avalon which resulted in a catch of 291 t (CPUE 15.2)

Table 27. Area 7A - Outer Trinity Bay.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1979	569		57.5		9.9			
1980	494		58.1		8.5			
1981	178		24.7		7.2			
1982	95		13.8		6.9			
1983	107		20.2		5.3			
1984	202		38.1		5.3			
1985	113		27.6		4.1			
1986	165		56.9		2.9			
1987	140		36.8		3.8			
1988	200		39.2		5.1			
1989	251		51.2		4.9		300	
1990	245		40.2		6.1		400	
1991	397		60.2		6.6		400	
1992	497	(176)	40.5	(13.1)	11.7	(13.4)	250	(150)
1993	751	(350)	52.5	(26.3)	15.3	(13.3)	300	(200)
1994	1066	(800)	68.0	(50.0)	14.8	(16.0)	300	(500)
1995	1060	(905)	70.7	(60.7)	15.5	(14.9)	200	(700)
1996	994	(814)	81.8	(69.0)	14.1	(11.8)	150	(800)

Table 28. Area 7B - Offshore Avalon (Shoal Patch).

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1981	1840		65.7		28.0			
1982	4194		218.4		19.2			
1983	1662		151.1		11.0			
1984	431		47.9		9.0			
1985	31		6.0		5.2			
1986	-		-		-			
1987	-		-		-			
1988	298		39.7		7.5			
1989	519		68.3		7.6			
1990	701		60.4		11.6		500	
1991	1371		114.3		12.0		1300	
1992	1758		102.2		17.2		1300	
1993	1730		82.8		20.9		1500	
1994	2383	(544)	118.1	(28.8)	20.6	(18.9)	1800	(200)
1995	2514	(841)	129.0	(47.8)	20.6	(17.6)	1700	(800)
1996	2638	(960)	151.4	(58.2)	18.0	(16.5)	1700	(800)

Fishers reported a high incidence of undersized bycatch in this area despite the fact that they had changed to large-meshed traps.

Table 29. Area 7C - Downing Basin.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1982	114		7.3		15.6			
1983	733		61.1		12.0			
1984	397		40.9		9.7			
1985	-		-		-			
1986	-		-		-			
1987	-		-		-			
1988	-		-		-			
1989	-		-		-			
1990	-		-		-			
1991	-		-		-			
1992	147		13.7		10.7		200	
1993	264		14.4		18.3		300	
1994	746		46.6		16.0		400	
1995	855	(374)	43.3	(20.4)	21.0	(18.3)	400	(300)
1996	833	(350)	49.8	(22.2)	17.5	(15.8)	450	(300)

Table 30. Area 7Bc - Shoal Patch/Downing Basin extended.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1995	539	(367)	29.8	(20.4)	18.2	(18.0)	175	(325)
1996	1237	(700)	69.6	(37.8)	16.9	(18.5)	550	(850)

Table 31. Area 3LMNO - Outside 200 miles.

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1995	1370	(934)	69.2	(47.4)	19.9	(19.7)	450	(1050)
1996*	1552	(1232)	149.2	(116.2)	9.7	(10.6)	300	(1200)

* A quota of 200 t and 400 t was allocated to the fulltime and supplementary crab fishers respectively in 3L outside 170 and inside 200 miles which resulted in a catch of 149 t (CPUE 17.5) and 353 t (CPUE 17.9), respectively.

Table 32. Area 8A - Southern Avalon (inside 50 miles).

Year	Total landings (t)	(Supp.)	Total effort ('000s)	(Supp.)	CPUE (kg/trap) Full	(Supp.)	Quota (t) Full	(Supp.)
1980	292		13.8		21.1			
1981	854		45.2		18.9			
1982	732		49.8		14.7			
1983	955		99.5		9.6			
1984	1068		135.2		7.9			
1985	627		87.1		7.2			
1986	1267		117.3		10.8			
1987	1129		92.5		12.2			
1988	2347		223.5		10.5		2300	
1989	1640		197.6		8.3		2400	
1990	448		65.9		6.8		2000	
1991	624		115.6		5.4		800	
1992	456	(276)	45.3	(25.1)	8.9	(11.0)	200	(200)
1993	855	(412)	85.1	(38.5)	9.5	(10.7)	400	(300)
1994	819	(303)	55.2	(20.3)	14.8	(14.9)	400	(800)
1995	-	(502)	-	(30.4)	-	(16.5)	-	(563)
1996	-	(464)	-	(25.4)	-	(18.3)	-	(700)

Table 33. Area 8B - Southern Avalon (outside 50 miles).

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1995	26	1.9	13.4	200
1996	295	18.0	16.4	300

Fishers reported a high abundance of undersized small-clawed crabs in their catches.

Table 34. Area 9A - St. Mary's Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1979	8	1.2	6.7	
1980	-	-	-	
1981	168	11.2	15.0	
1982	506	48.2	10.5	
1983	274	37.5	7.3	
1984	264	35.2	7.5	
1985	164	23.1	7.1	
1986	102	21.3	4.8	
1987	4	0.7	5.8	
1988	266	36.9	7.2	
1989	217	29.7	7.3	200
1990	267	31.0	8.6	200
1991	317	27.8	11.4	300
1992	306	27.1	11.3	300
1993	441	36.8	12.0	300
1994	484	29.7	16.3	400
1995	515	35.0	14.7	525
1996	530	58.2	9.1	525

Fishers in this area feel that the resource is currently over-exploited and feel that a quota reduction is warranted. They also report that there is a high incidence of small-clawed crabs in their catches.

Table 35. Area 9B - St. Mary's Bay (west of Cape Pine).

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1995	39	-	-	200
1996	39	3.6	10.8	200

Table 36. Area 10A - Placentia Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1983	43	3.1	13.9	
1984	175	18.6	9.4	
1985	385	44.8	8.6	
1986	930	91.2	10.2	
1987	596	198.7	3.0	600
1988	856	231.4	3.7	600
1989	529	112.6	4.7	600
1990	596	119.2	5.0	600
1991	176	31.4	5.6	600
1992	121	11.4	10.6	400
1993	603	55.3	10.9	400
1994	895	57.7	15.5	400
1995	700	44.3	15.8	625
1996*	1039	53.3	19.5	1000

* A quota of 750 t was allocated to fishers in Area 10 between 46°30'N and 46°N which resulted in a catch of 759 t (CPUE 20.3)

Fishers reported a high abundance of soft-shelled and undersized crabs in this area in 1996.

Table 37. Area 10C - Halibut Channel (south of 46°).

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1994	289	14.0	20.6	250
1995	818	44.2	18.5	800
1996	747	41.0	18.2	750

Table 38. Area 11 - Fortune Bay.

Year	Total landings (t)	Effort ('000s)	CPUE (kg/trap)	Quota (t)
1993	101	10.9	9.3	100
1994	406	35.0	11.6	200
1995	335	59.8	5.6	575
1996	292	21.2	13.8	350

A quota of 200 t was allocated to fishers in Area 11 south of 46°15'N which resulted in a catch of 215 t (CPUE 6.3).

Table 39. Area 4R/3Pn west/south coast (fulltime).

Area	Year	Quota (t)	Landings (t)	Effort ('000 tr. h)	CPUE (kg/tr. h)
Area 13	1994	889	870 (334)[1]	61.9[2]	5.4[2]
	1995	889	883 (198)	29.6	6.7
	1996	1111	1071 (39)	7.4	5.3
South of Table Point + 3Pn	1994	-	157	-	3.8
	1995	225	205	-	2.6
	1996	645	454[3]	126.1	3.6
Bay of Islands	1994	110	106	16.6	6.3
	1995	110	110	16.9	6.5
	1996	80	57	13.9	4.1
St. George's Bay	1994	65	58	8.4	7.1
	1995	65	64	7.9	8.1
	1996	50	45	5.6	8.1

[1] Both Quebec and Newfoundland vessels landed in the other Province and the incidence varies. Landings in Newfoundland in brackets ( ).

[2] Effort and CPUE are for Newfoundland vessels only.

[3] 1984 t landed in Quebec

1996 landings are from dockside monitoring to December 3, 1996.

Table 40. Area 4R/3Pn - west/south coast (temporary).

Area	Year	Quota (t)	Landings (t)	Effort ('000 tr. h)	CPUE (kg/tr. h)
A. Lapoile Bay	1995	15	13	-	-
	1996	39	8	3.1	2.6
B. Cape Ray-Johnsons Cove	1995	10	2	-	-
	1996	20	4	0.9	4.4
C. Johnsons Cove-Cape St. George	1995	25	24	-	-
	1996	66	63	9.4	6.7
D. Cape St. George-Bear Head	1995	25	25	-	-
	1996	69	62	10.8	5.7
E. Bear Head-Cape St. Gregory	1995	50	50	-	-
	1996	81	31	11.0	2.8
F. Inside Bay of Islands	1995	-	-	-	-
	1996	30	24	7.5	3.2
G. Cape St. Gregory-Broom Point	1995	60	59	-	-
	1996	140	140	15.2	9.0
H. Broom Point-Table Point	1995	50	27	-	-
	1996	69	36	5.1	7.0
Area 13 (West Nfld. vessels)	1995	-	-	-	-
	1996	60	37	7.7	4.8
TOTALS	1995	235	200		
	1996	574	405		

1996 landings are from dockside monitoring to December 3, 1996.

Table 41. Comparison of observer and logbook data for the snow crab fishery in 1995-96.

Area	CPUE 1995			CPUE 1996		
	Logbook	Observer	# traps	Logbook	Observer	# traps
2JS	11.3	10.0	12	5.2	11.9	1
2JSX	-	-	-	20.0	11.8	4
2JN	-	-	-	10.2	6.5	6
3A	3.3	4.0	1	-	-	-
3B	14.0	8.5	3	-	-	-
3C	18.2	9.3	1	-	-	-
3K	21.2	15.4	68	2.9	15.1	1
3Kb	19.1	14.0	5	10.3	16.4	1
3Kc	18.1	12.2	7	34.9	16.1	1
3Kg	30.9	17.7	6	-	-	-
5B	19.1	17.5	6	6.8	14.6	1
5BX	19.3	18.7	6	-	-	-
6C	11.2	19.7	3	-	-	-
7A	19.7	15.5	4	-	-	-
7B	22.4	20.6	55	27.8	18.0	1
40	5.8	6.7	91	-	-	-
41	3.2	2.6	14	-	-	-
42	6.6	6.5	6	-	-	-
45	7.0	8.1	6	-	-	-

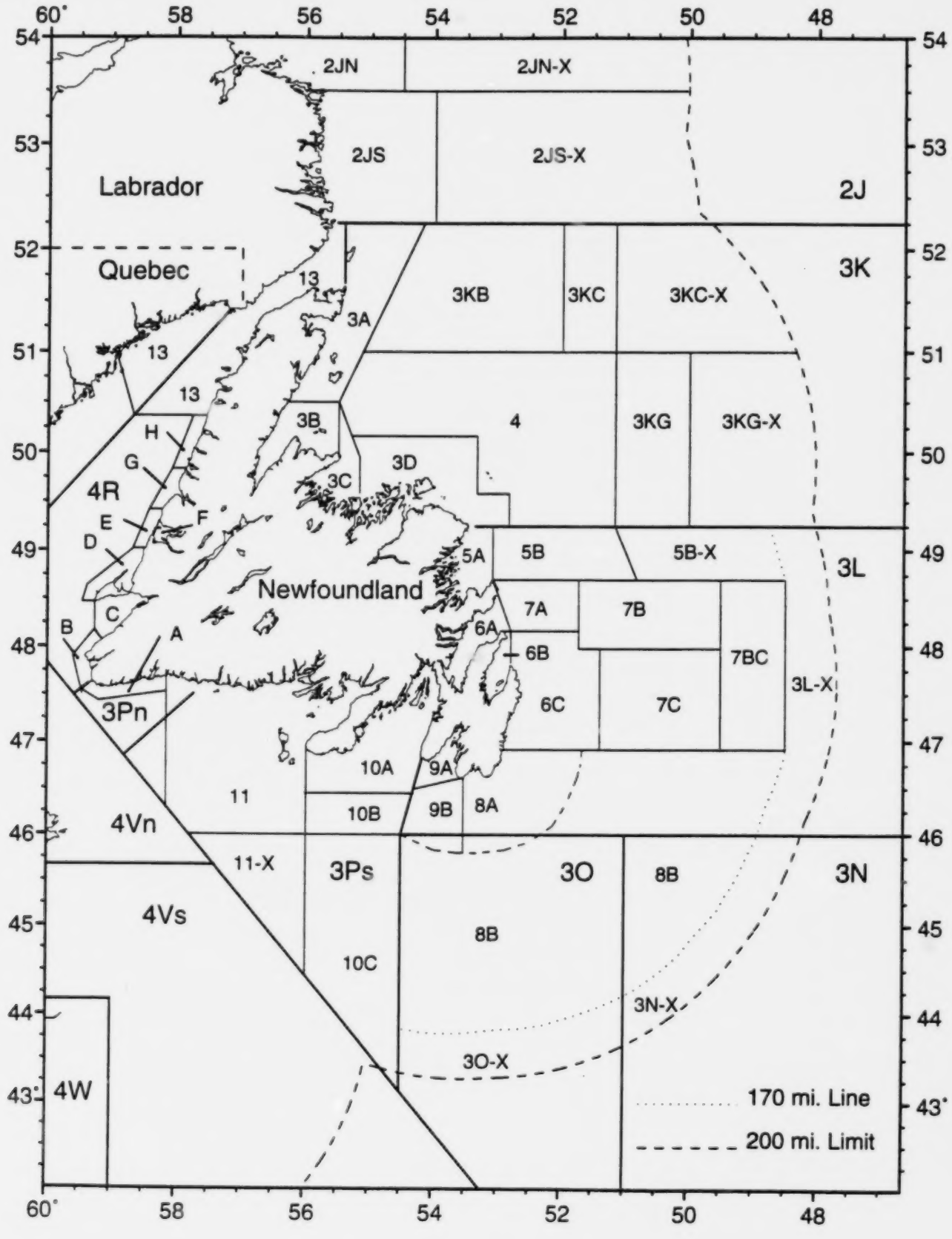
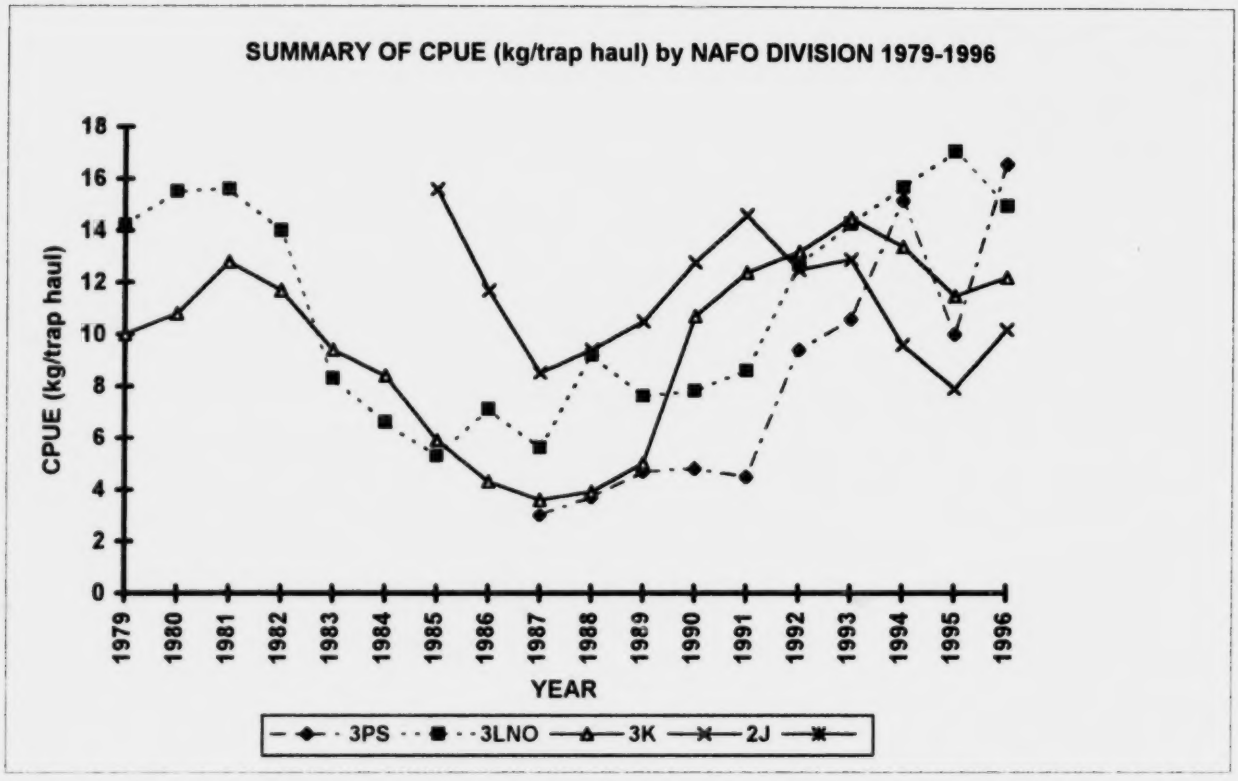


Figure 1. Snow crab management areas for Newfoundland and Labrador



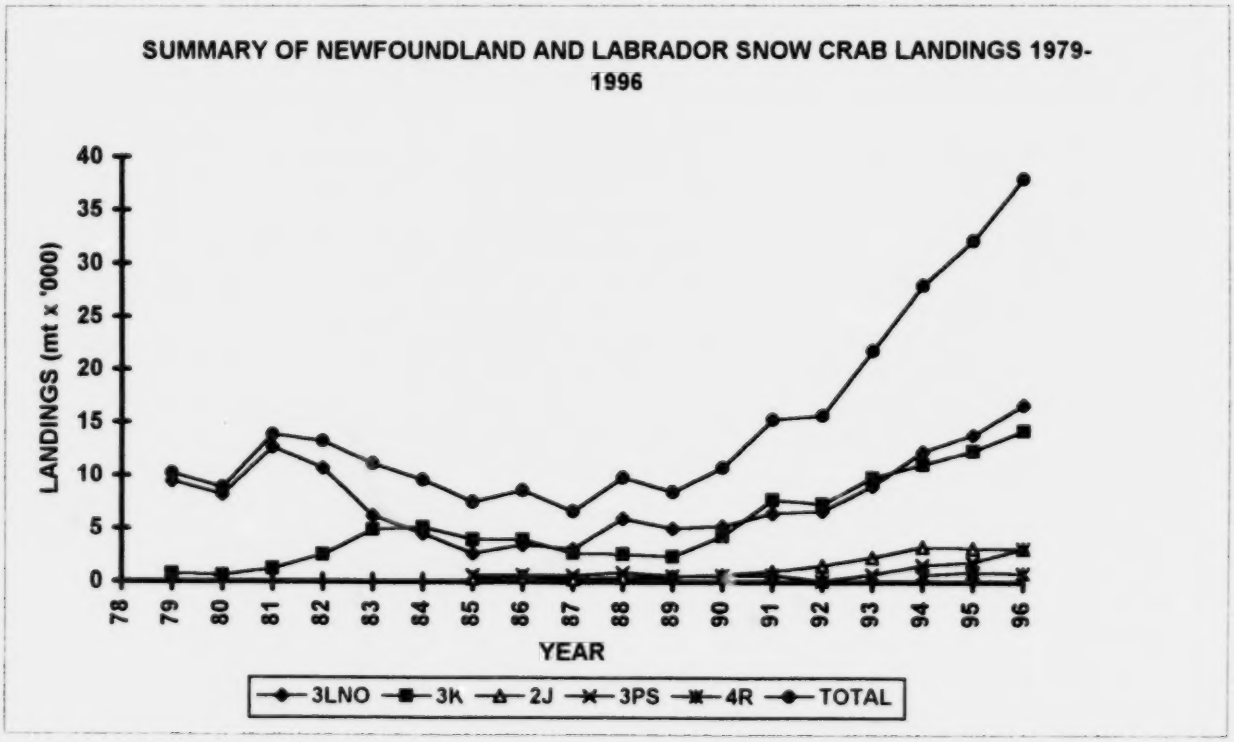


Figure 2. Summary of landings and CPUE (kg/trap haul) by NAFO division, 1979-1996.

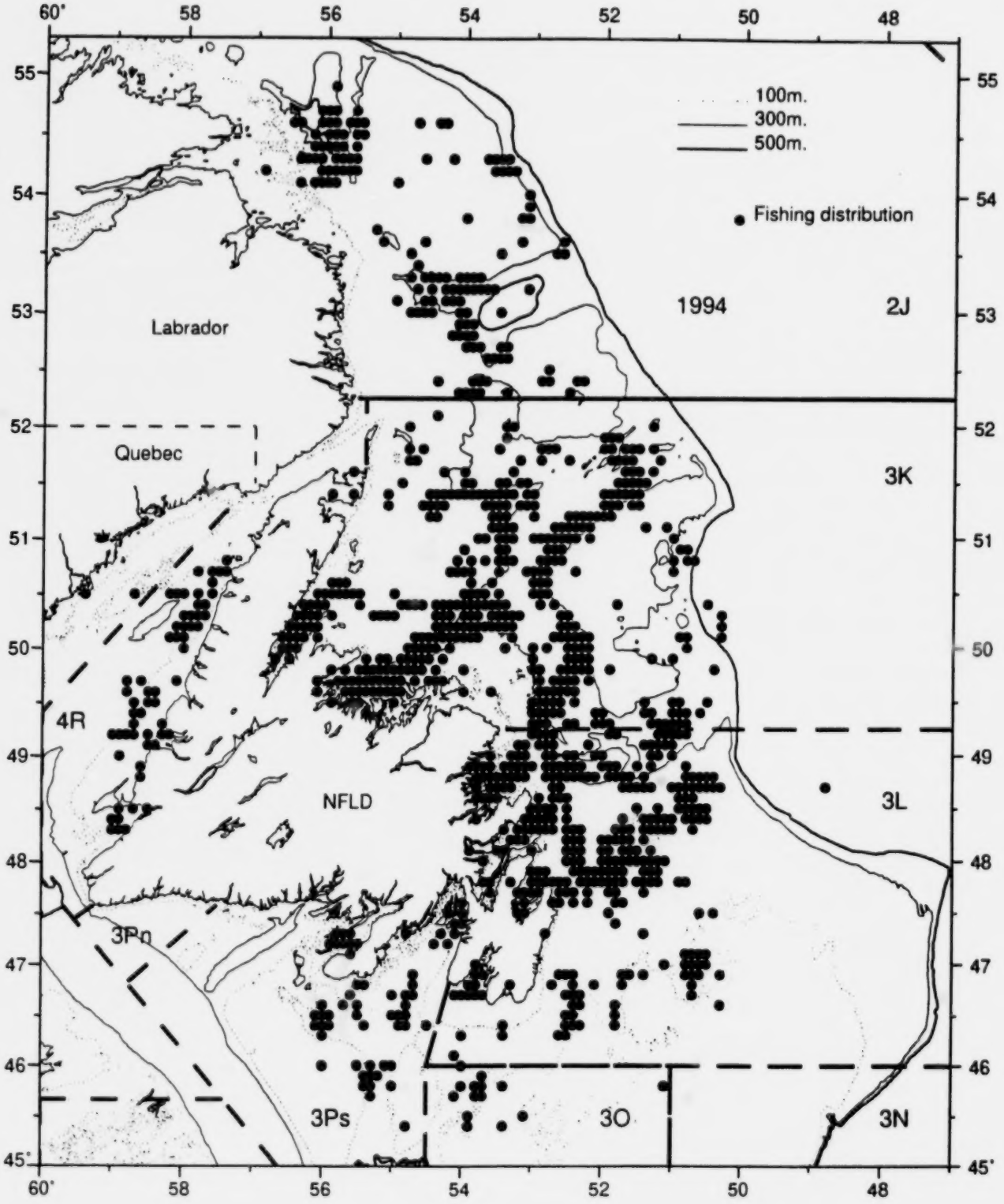


Figure 3a. Distribution of crab fishing effort, 1994.

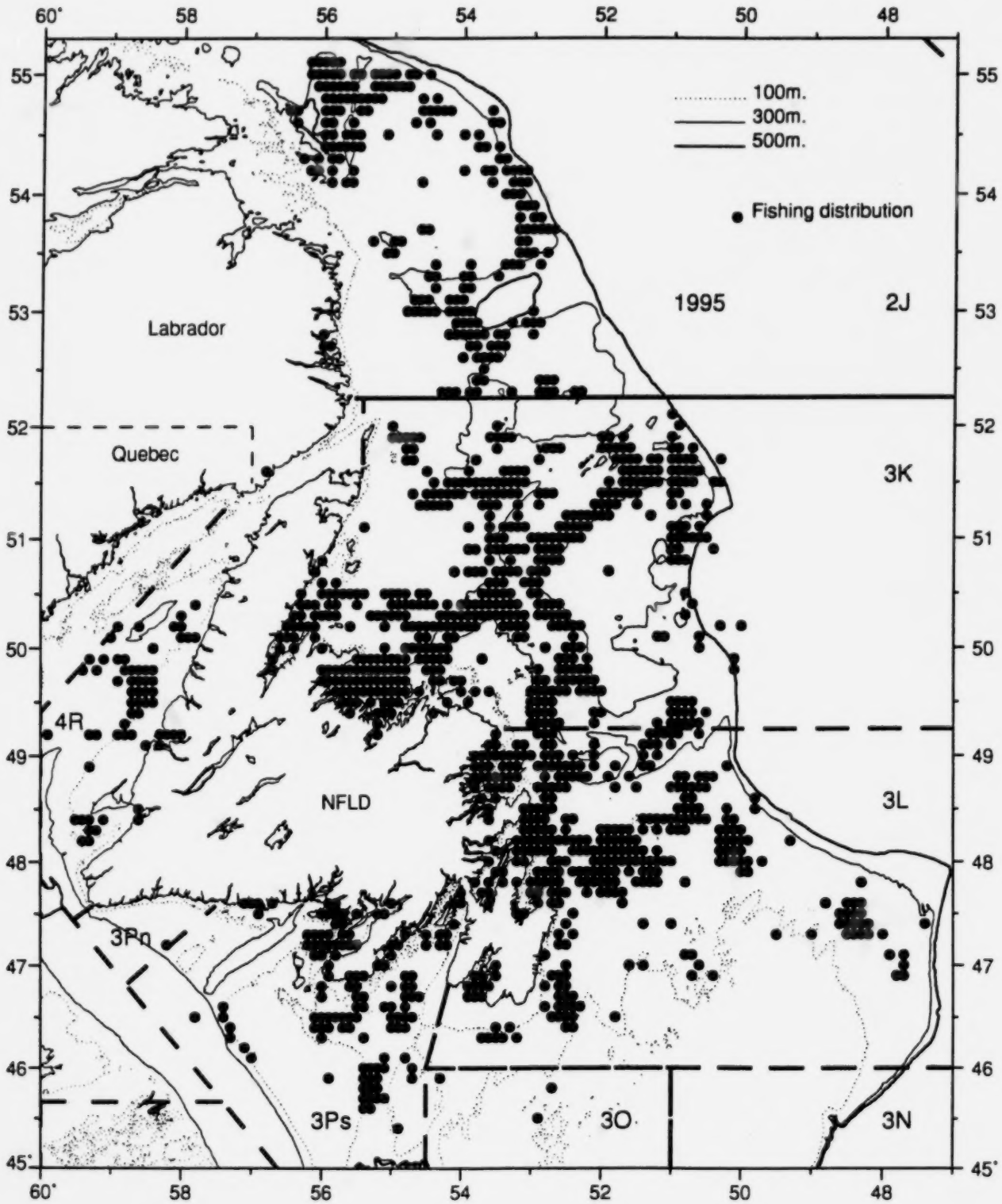


Figure 3b. Distribution of crab fishing effort, 1995.

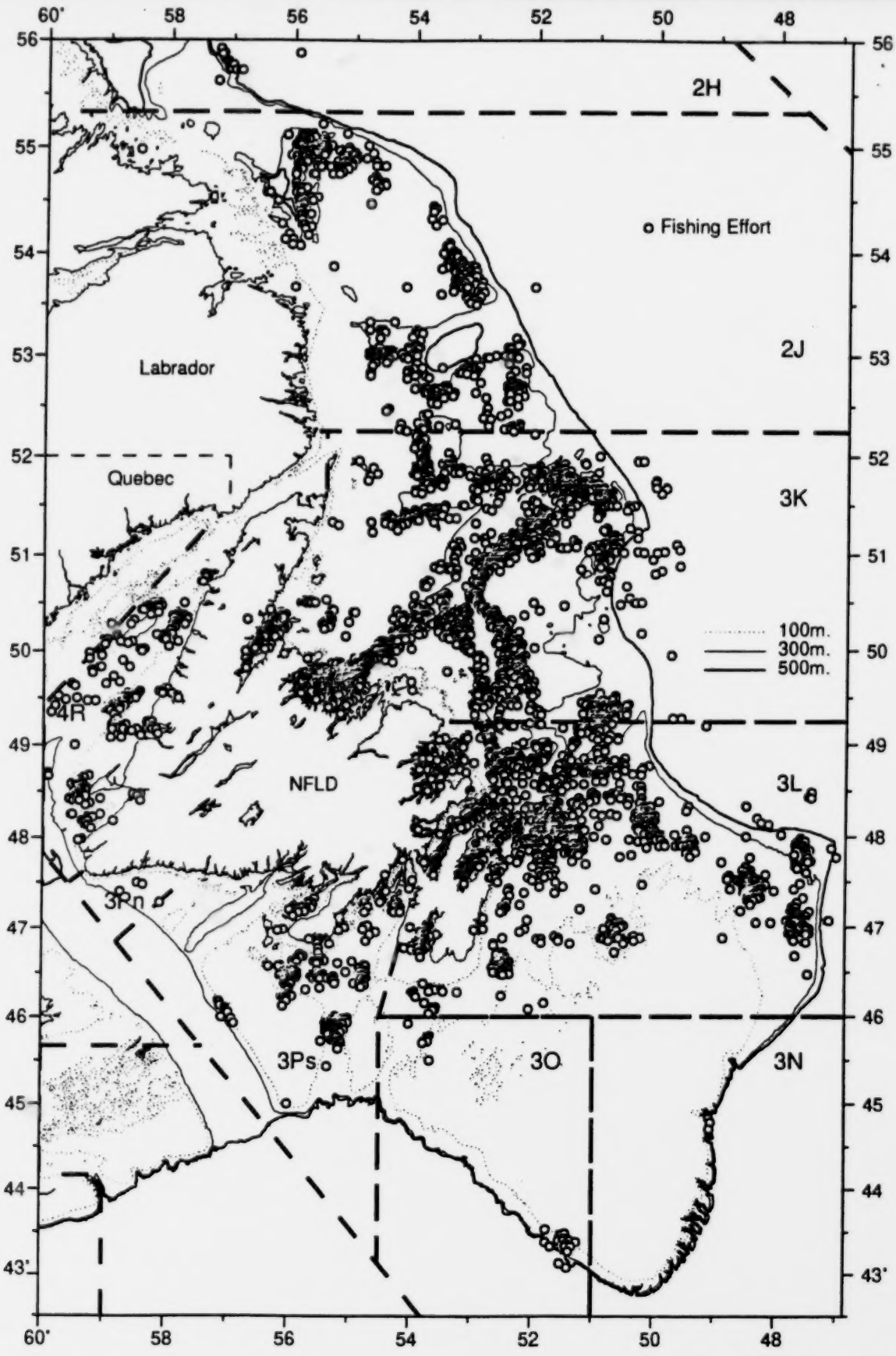


Figure 3c. Distribution of crab fishing effort, 1996.